

Rate Structure Analysis Workbook

Overview:

How to use this Workbook:

Estimating Total Revenue

Instructions are listed below for completing the "Data Inputs" and "Rate Calculations" worksheet, with details li

Worksheets

24-Aug-18

This workbook was developed by the Environmental Finance Center (EFC) at California State University, Sacran

The workbook includes a sheet for entering inputs on community characteristics, and sheet that performs calcula

Once all the data inputs are completed (see detailed instructions below), the primary decision parameter is the

sted by column name

1) Data Inputs

The "Data Inputs" tab lists data necessary for calculating estimates of potential revenue

Inputs, by data topic

<i>Water Use, Lot Size, and Imperviousness</i>	Data on community water use ass
<i>Water and Sewer Rates</i>	Data for municipal water and was
<i>Socio-demographic and Income</i>	Data for Median Household Incon
<i>Other Inputs and CPI Adjustments</i>	Data for additional inputs, includi

2) Rate Calculations

The "Rate Calculations" tabs automatically calculate the projected revenue for a 5-year time period based on ir

Input Parameter in Green

In both of the Rate Calculations worksheets, the sole input variable is the Year 1 tarriff rate in cell F7 (in dark gr

The table starting in line 17 reports the estimated financial impacts of the tarriffs on households with the lowe:

amento (Sacramento State) for municipalities and rural communities in EPA
ulations of potential revenues based on municipal area characteristics, and a
amount of the Tariff in cell F7 of the "Rate Calculations- ERU" and "Rate

umptions (indoor), household size, lot size, and imperviousness. These are
ewater utility billing rates. Collected from publicly-available sources
ne, based on analyzing 2014 U.S. Census American Community Survey (ACS)
ng inflation rates for indexing past values to current dollars based on the

inputs from the "Data Inputs" tab and the selected tariff rate.

reen), as identified in the spreadsheet. The resulting projected annual
st reported MHI (Block Group level). The "Disparity" line reports the financial

INPUTS

Utility Area Inputs

Water Use, Lot, and Imperviousness

<i>Parameter</i>	<i>Value</i>
Daily Indoor Use (gal)	55
Avg SF Lot Size (sq-ft)	16,000
Median SF Lot Size (Sq-Ft)	8,000
Avg MF Lot Size (sq-ft)	9,000
Median MF Lot Size (Sq-Ft)	6,000

Other Inputs

<i>Parameter</i>	<i>Value</i>
Inflation Rate	3%

Land Use Data

<i>Land Use Type</i>	<i>Number of Properties</i>
# SF Properties	7,000
# MF Properties	2,000
# Commercial	500
# Industrial	40
# Other	3,000

ERU Data from Sample Set (~1000 Properties)

<i>Land Use Type</i>	<i>Avg Impervious %</i>
# SF Properties	45
# MF Properties	65
# Commercial	70
# Industrial	40

CPI Adjustments

<i>Year</i>	<i>Historic Inflation</i>
2014 ACS MHI	
CPI Adjustments	
US 2015	2.11%
US 2016	2.07%
US 2017	0.73%

<i>Persons/HH</i>
3
3
n/a
n/a
n/a

Reported Water and Sewer Rates for Utility

<i>Year</i>	<i>Water Supply Flat Rate</i>
2017	\$ 4.00
2018	\$ 4.50
2019	\$ 5.00
2020	\$ 5.50
2021	\$ 6.00

<i>Median Impervious Area (sq-ft)</i>
4,000
2,500
8,000
14,000

Assumed Stormwater Fee Rate Increases

Annual Increase	2%
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<i>MHI</i>
\$ 32,000.00
\$ 32,675.20
\$ 33,351.58
\$ 33,595.04

<i>Published % Increase</i>	<i>Water Variable Rate (\$/100 cu-ft, 748 gal)</i>	<i>Sewer Rate</i>	<i>Monthly Total</i>
	\$ 7.00	\$4.50	\$ 54.82
13%	\$ 7.25	\$5.40	\$ 57.88
11%	\$ 7.50	\$6.30	\$ 60.93
10%	\$ 7.75	\$7.35	\$ 64.14
9%	\$ 8.00	\$7.80	\$ 66.74

Socio-Demographic and Income Characteristics

<i>Indicator</i>	<i>Value</i>
Lowest ACS MHI (blockgroup), 2014	\$32,000
Lowest ACS BG MHI, CPI Adj. to 2018	\$33,595
<i>MHI Brackets</i>	
0-10%	
10-20%	
20-30%	
30-40%	
40-50%	
50-60%	
60-70%	
70-80%	
80-90%	
90-100%	

The following tabs in this section (yellow) show preliminary calculations for revenues associated with various rate structure approaches

In all spreadsheets, the only user input to change is marked by the "<< input decision variable" notation, either an ERU tariff rate or a desired total amount of money

ERU: Equivalent Residential Unit method

**RATES ANALYSIS: Based on an
Equivalent Residential Unit of
Imperviousness (Single Rate)**

6/27/2018

**CSUS Office of Water Programs
Environmental Finance Center**

PROGRAM REVENUE

Residential
Commercial & Mixed Use
Industrial
TOTALS

TOTALS ACROSS

SF Residential
MF Residential
Commercial & Mixed Use
Industrial
TOTALS

HOUSEHOLD AFFORDABILITY

ERU Structure

Tiers (Changes by Property Type)	# of SF Properties
1 ERU	4000
2 ERUs	2000
3 ERUs	1000

NUE PROJECTIONS*

Year	<u>1</u>
Estimated Charge (based on 55 gpd indoor, sewer)	\$ 54.82
Stormwater Tariff (1 ERU)	\$ 2.15
Monthly Bill Estimate (w/ reported rate increases)	\$ 56.97
Annual Bill Estimate (w/ reported rate increases)	\$ 684
Subtotal: Revenues from SF Properties	\$ 283,800
Subtotal: Revenues from MF Properties	\$ 82,560
Subtotal: Revenues from Comm-MU Properties	\$ 67,080
Subtotal: Revenues from Industrial Properties	\$ 2,116
STORMWATER PROGRAM REVENUE	\$ 435,556

3 ERU CATEGORIES

Year	<u>1</u>
Subtotal: ERU Tier 1	\$ 103,200.00
Subtotal: ERU Tier 2	\$ 103,200.00
Subtotal: ERU Tier 3	\$ 77,400.00
Subtotal: ERU Tier 1	\$ 18,060.00
Subtotal: ERU Tier 2	\$ 41,280.00
Subtotal: ERU Tier 3	\$ 23,220.00
Subtotal: ERU Tier 1	\$ 18,060.00
Subtotal: ERU Tier 2	\$ 10,320.00
Subtotal: ERU Tier 3	\$ 38,700.00
Subtotal: ERU Tier 1	\$ 129.00
Subtotal: ERU Tier 2	\$ 51.60
Subtotal: ERU Tier 3	\$ 1,935.00
Total revenue (should match above)	\$ 435,556

AFORDABILITY**

Analysis of Household Affordability	
Associated MHI Threshold for Total Monthly Bill	
1%	\$ 68,368.24

# of MF Properties	Commercial	Industrial
700	700	5
800	200	1
300	500	25

<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
\$ 57.88	\$ 60.93	\$ 64.14	\$ 66.74
\$ 2.19	\$ 2.24	\$ 2.28	\$ 2.33
\$ 60.07	\$ 63.17	\$ 66.42	\$ 69.07
\$ 721	\$ 758	\$ 797	\$ 829
\$ 289,476	\$ 295,266	\$ 301,171	\$ 307,194
\$ 84,211	\$ 85,895	\$ 87,613	\$ 89,366
\$ 68,422	\$ 69,790	\$ 71,186	\$ 72,610
\$ 2,158	\$ 2,201	\$ 2,245	\$ 2,290
\$ 444,267	\$ 453,152	\$ 462,215	\$ 471,459

<< Input Decision Variable

<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
\$ 105,264.00	\$ 107,369.28	\$ 109,516.67	\$ 111,707.00
\$ 105,264.00	\$ 107,369.28	\$ 109,516.67	\$ 111,707.00
\$ 78,948.00	\$ 80,526.96	\$ 82,137.50	\$ 83,780.25
\$ 18,421.20	\$ 18,789.62	\$ 19,165.42	\$ 19,548.72
\$ 42,105.60	\$ 42,947.71	\$ 43,806.67	\$ 44,682.80
\$ 23,684.40	\$ 24,158.09	\$ 24,641.25	\$ 25,134.07
\$ 18,421.20	\$ 18,789.62	\$ 19,165.42	\$ 19,548.72
\$ 10,526.40	\$ 10,736.93	\$ 10,951.67	\$ 11,170.70
\$ 39,474.00	\$ 40,263.48	\$ 41,068.75	\$ 41,890.12
\$ 131.58	\$ 134.21	\$ 136.90	\$ 139.63
\$ 52.63	\$ 53.68	\$ 54.76	\$ 55.85
\$ 1,973.70	\$ 2,013.17	\$ 2,053.44	\$ 2,094.51
\$ 444,267	\$ 453,152	\$ 462,215	\$ 471,459

\$ 72,085.13	\$ 75,803.06	\$ 79,702.03	\$ 82,882.09

**Blockgroup with
Lowest MHI
(Most
Vulnerable)**

* Based on nominal

** Based on nominal

2%	\$ 34,184.12
<i>Annual Expense of 2018-Adjusted MHI Threshold (\$35,432)</i>	
1%	\$ 346.03
2%	\$ 692.06
<i>Disparity</i>	
1%	\$ 337.65
2%	n/a

al costs (in that year) of rates using published rate increases and no additional inflation
al values of Median Household Income values in each year using 3% inflation rate

\$ 36,042.56	\$ 37,901.53	\$ 39,851.02	\$ 41,441.04
\$ 356.11	\$ 366.19	\$ 376.26	\$ 386.34
\$ 712.21	\$ 732.37	\$ 752.53	\$ 772.69
\$ 364.74	\$ 391.84	\$ 420.76	\$ 442.48
\$ 8.64	\$ 25.66	\$ 44.49	\$ 56.13

on considerations

**RATES ANALYSIS: Based on an
Equivalent Residential Unit of
Imperviousness (Graduated Rate)**

6/27/2018

***CSUS Office of Water Programs
Environmental Finance Center***

PROGRAM REVE

Residential
Commercial & Mixed Use
Industrial
TOTALS

HOUSEHOLD AFI

Blockgroup with Lowest MHI (Most Vulnerable)

* Based on nominal

** Based on nominal

ERU Structure

Tiers	# of SF Properties
1 ERU	4000
2 ERUs	2000
3 ERUs	1000

NUE PROJECTIONS*

Year	<u>1</u>
Estimated Charge (based on 55 gpd indoor, sewer)	\$ 54.82
Stormwater Tarriff (1st ERU Tier)	\$ 2.00
Stormwater Tarriff (2nd ERU Tier)	\$ 2.40
Stormwater Tarriff (3rd ERU Tier)	\$ 2.88
Monthly Bill Estimate (w/ reported rate increases)	\$ 56.82
Annual Bill Estimate (w/ reported rate increases)	\$ 682
<i>Subtotal: Revenues from SF Properties</i>	\$ 288,960
<i>Subtotal: Revenues from MF Properties</i>	\$ 85,248
<i>Subtotal: Revenues from Comm-MU Properties</i>	\$ 53,760
<i>Subtotal: Revenues from Industrial Properties</i>	\$ 2,357
STORMWATER PROGRAM REVENUE	\$ 430,325

AFFORDABILITY**

Analysis of Household Affordability	
<i>Associated MHI Threshold for Total Monthly Bill</i>	
1%	\$ 68,188.24
2%	\$ 34,094.12
<i>Annual Expense of 2018-Adjusted MHI Threshold (\$35,432)</i>	
1%	\$ 346.03
2%	\$ 692.06
<i>Disparity</i>	
1%	\$ 335.85
2%	n/a

all costs (in that year) of rates using published rate increases and no additional inflation. All values of Median Household Income values in each year using 3% inflation rate

# of MF Properties	Commercial	Industrial
700	700	5
800	200	1
300	500	25

<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
\$ 57.88	\$ 60.93	\$ 64.14	\$ 66.74
\$ 2.04	\$ 2.08	\$ 2.12	\$ 2.16
\$ 2.45	\$ 2.50	\$ 2.55	\$ 2.60
\$ 2.94	\$ 3.00	\$ 3.06	\$ 3.12
\$ 59.92	\$ 63.01	\$ 66.26	\$ 68.91
\$ 719	\$ 756	\$ 795	\$ 827
\$ 294,739	\$ 300,634	\$ 306,647	\$ 312,780
\$ 86,953	\$ 88,692	\$ 90,466	\$ 92,275
\$ 54,835	\$ 55,932	\$ 57,051	\$ 58,192
\$ 2,404	\$ 2,452	\$ 2,501	\$ 2,551
\$ 438,931	\$ 447,710	\$ 456,664	\$ 465,797

<< Input Decision Variable

\$ 71,901.53	\$ 75,615.78	\$ 79,511.02	\$ 82,687.25
\$ 35,950.76	\$ 37,807.89	\$ 39,755.51	\$ 41,343.62
\$ 356.11	\$ 366.19	\$ 376.26	\$ 386.34
\$ 712.21	\$ 732.37	\$ 752.53	\$ 772.69
\$ 362.91	\$ 389.97	\$ 418.85	\$ 440.53
\$ 6.80	\$ 23.79	\$ 42.58	\$ 54.19

on considerations

**RATES ANALYSIS: Based on
identifying a desired annual
program revenue and calculating
the associated ERU**

6/27/2018

***CSUS Office of Water Programs
Environmental Finance Center***

ERU for DESIRED

Desired Total
Residential
Commercial & Mixed Use
Industrial
ERU
Existing Bill
New Bill

TOTALS ACROSS

SF Residential
MF Residential
Commercial & Mixed Use
Industrial
TOTALS

ERU Structure

Tiers	# of SF Properties
1 ERU	4000
2 ERUs	2000
3 ERUs	1000
Totals	7000
Number of ERUs	11000
% of ERUs	65%

PROGRAM REVENUE REQUIREMENT

Year	<u>1</u>
STORMWATER PROGRAM REVENUE	\$ 500,000
<i>Subtotal: Revenues from SF Properties</i>	\$ 325,790.78
<i>Subtotal: Revenues from MF Properties</i>	\$ 94,775.50
<i>Subtotal: Revenues from Comm-MU Properties</i>	\$ 77,005.09
<i>Subtotal: Revenues from Industrial Properties</i>	\$ 2,428.62
Stormwater Tarriff (1 ERU)	\$ 2.47
Estimated Current Charges (based on 55 gpd indoor, sewer)	\$ 54.82
Total Monthly Bill	\$ 57.29
Total Monthly Bill	\$ 687.50

ERU CATEGORIES

Year	<u>1</u>
Subtotal: ERU Tier 1	\$ 118,469.38
Subtotal: ERU Tier 2	\$ 118,469.38
Subtotal: ERU Tier 3	\$ 88,852.03
Subtotal: ERU Tier 1	\$ 20,732.14
Subtotal: ERU Tier 2	\$ 47,387.75
Subtotal: ERU Tier 3	\$ 26,655.61
Subtotal: ERU Tier 1	\$ 20,732.14
Subtotal: ERU Tier 2	\$ 11,846.94
Subtotal: ERU Tier 3	\$ 44,426.02
Subtotal: ERU Tier 1	\$ 148.09
Subtotal: ERU Tier 2	\$ 59.23
Subtotal: ERU Tier 3	\$ 2,221.30
Total revenue (should match above)	\$ 500,000

# of MF Properties	Commercial	Industrial	Total
700	700	5	5405
800	200	1	3001
300	500	25	1825
1800	1400	31	10231
3200	2600	82	16882
19%	15%	0%	100%

<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
\$ 505,000	\$ 510,050	\$ 515,151	\$ 520,302
\$ 329,048.69	\$ 332,339.18	\$ 335,662.57	\$ 339,019.20
\$ 95,723.26	\$ 96,680.49	\$ 97,647.29	\$ 98,623.77
\$ 77,775.15	\$ 78,552.90	\$ 79,338.43	\$ 80,131.81
\$ 2,452.91	\$ 2,477.44	\$ 2,502.21	\$ 2,527.23
\$ 2.49	\$ 2.52	\$ 2.54	\$ 2.57
\$ 57.88	\$ 60.93	\$ 64.14	\$ 66.74
\$ 60.37	\$ 63.45	\$ 66.68	\$ 69.31
\$ 724.45	\$ 761.40	\$ 800.16	\$ 831.71

<< Input Decision Variable

<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
\$ 119,654.07	\$ 120,850.61	\$ 122,059.12	\$ 123,279.71
\$ 119,654.07	\$ 120,850.61	\$ 122,059.12	\$ 123,279.71
\$ 89,740.55	\$ 90,637.96	\$ 91,544.34	\$ 92,459.78
\$ 20,939.46	\$ 21,148.86	\$ 21,360.35	\$ 21,573.95
\$ 47,861.63	\$ 48,340.24	\$ 48,823.65	\$ 49,311.88
\$ 26,922.17	\$ 27,191.39	\$ 27,463.30	\$ 27,737.93
\$ 20,939.46	\$ 21,148.86	\$ 21,360.35	\$ 21,573.95
\$ 11,965.41	\$ 12,085.06	\$ 12,205.91	\$ 12,327.97
\$ 44,870.28	\$ 45,318.98	\$ 45,772.17	\$ 46,229.89
\$ 149.57	\$ 151.06	\$ 152.57	\$ 154.10
\$ 59.83	\$ 60.43	\$ 61.03	\$ 61.64
\$ 2,243.51	\$ 2,265.95	\$ 2,288.61	\$ 2,311.49
\$ 505,000	\$ 510,050	\$ 515,151	\$ 520,302

HOUSEHOLD AFI

Blockgroup with Lowest MHI (Most Vulnerable)

* Based on nominal

** Based on nominal

ORDABILITY**

Analysis of Household Affordability	
<i>Associated MHI Threshold for Total Monthly Bill</i>	
1%	\$ 68,749.97
2%	\$ 34,374.98
<i>Annual Expense of 2018-Adjusted MHI Threshold (\$35,432)</i>	
1%	\$ 346.03
2%	\$ 692.06
<i>Disparity</i>	
1%	\$ 341.47
2%	n/a

al costs (in that year) of rates using published rate increases and no additional inflati
 al values of Median Household Income values in each year using 3% inflation rate

\$ 72,444.88	\$ 76,140.09	\$ 80,015.60	\$ 83,171.40
\$ 36,222.44	\$ 38,070.04	\$ 40,007.80	\$ 41,585.70
\$ 356.11	\$ 366.19	\$ 376.26	\$ 386.34
\$ 712.21	\$ 732.37	\$ 752.53	\$ 772.69
\$ 368.34	\$ 395.21	\$ 423.89	\$ 445.37
\$ 12.23	\$ 29.03	\$ 47.63	\$ 59.03

on considerations

Survey of Existing Stormwater Assessments and Fees in Cali

To learn more about municipal stormwater permits throughout the U.S

Campbell, C. Warren, et al. "Western Kentucky university stormwater utility sur
<https://www.wku.edu/seas/documents/swusurvey-2016.pdf>

Municipality	Assessment Method for Residential Units
CITY OF PALO ALTO	Base Rate
CITY OF SANTA CLARITA	Base Rate
CITY OF HUNTINGTON PARK	Base Rate + Per Amt of Impervious Area
CITY OF MONROVIA	Base Rate + Per Dwelling Unit
CITY OF BEVERLY HILLS	Flat Rate
CITY OF CLAYTON	Flat Rate
CITY OF ALHAMBRA	None
CITY OF LOS ANGELES	Per Dwelling Unit

fornia

5., please see the following reference:

vey." (2016): 1-50.

Rate (Residential)	Assessment Method for Non-Residential Units
\$7.48 / ERU / mo	Base Rate
\$24.04 / ERU / mo	Base Rate
\$7.15 for first 3000 sq ft., addl \$1.05 for 1000 sq ft	Base Rate + Per Amt of Impervious Area
Residential: \$1.68 / mo + \$1.25 / add'l unit / mo Trailer: \$2.55 / mo + \$1.92 / add'l space	Base Rate + Per Dwelling Unit
Residential R-1 (bimonthly): \$17.56 Residential R-4 (per unit bimonthly): \$7.26	Flat Rate
\$3.75 / mo	Per Amt of Impervious Area
	None
\$1.92 / EDU /mo	

Rate (Non-Residential)
\$6.17 / ERU / mo
\$24.04 / ERU / mo
\$7.15 for first 3000 sq ft., addl \$1.05 for 1000 sq ft
Commercial: \$2.70 / mo + \$2.02 / add'l comm / mo Industrial: \$3.13 / mo Public Facilities: \$10.70 Cemetery: \$2.70
Commercial, Industrial, Municipal (bimonthly for each water customer within city limits): \$143.26

Notes
<p>Actual impervious surface is determined by using aerial photography that is digitized and matched to the County's tax records.</p> <p>One Stormwater Unit equals 2,950 square feet which is the typical amount of impervious surfaces on a property with a single family residence. This unit was developed by a process that included analyzing aerial photography of nearly 10% of all single family residences across Clayton County to determine the amount of impervious surface each had. The average was 2,950 square feet.</p>
<p>Improvement (Construction) Plan Check Fee (for all improvements to water, sewer or storm drain facilities) fee is based on valuation of improvement costs. The City currently has no Storm Water Inspection fee. This inspection is required form compliance with the NPDES. This fee will cover the costs incurred by the City for a 5 year term with 2 inspections by City staff. Cost does not include a City business license (Fee collected with Bus. Lic.)</p>
<p>The unit of measure for the City of Los Angeles is based on the Basic Assessment Unit (BAU), which is the “the proportionate run-off from the average single-family residential parcel. The average single family residential parcel has an area of 0.1526 acres (6,650 square feet) and a run-off factor of 0.4176. The product these (0.0637) is defined as the Basic Assessment Unit.” The number of BAUs a particular parcel represents, the “Equivalent Dwelling Unit” (EDU), is determined using the following formula: $EDU = [(parcel\ area\ in\ acres) \times (parcel\ runoff\ factor)] / BAU$</p>

CITY OF SACRAMENTO (Drainage Charge)	Per Dwelling Unit
CITY OF CULVER CITY	Flat fee per property

1-3 Rooms: \$7.53 / mo 4-5 Rooms: \$9.58 / mo 6-7 Rooms: \$11.31 / mo 8-9 Rooms: \$13.38 / mo 10-15 Rooms: \$15.25 / mo Each addl room after 15: +\$1.19	Per Gross Surface Area
\$99/year for SF residential dwellings \$69/year for MF residential dwellings \$1,096/year/acre of land for non- residential	Flat fee per property

\$0.001928 / per sq ft

\$1,096/year/acre of land for non-residential

Cemeteries, City Parks, and Airports are charged per sq ft of impervious surface area